

CLAIMS:

1 1. A method for providing a mixture of drilling fluid and
2 beads into a flow of drilling fluid flowing upwardly within a
3 riser, the method comprising

4 introducing an initial stream including a mixture of
5 drilling fluid and beads into a hydrocyclone,

6 processing the initial stream with the hydrocyclone
7 producing a first stream and a second stream, the first stream
8 containing drilling fluid and beads and the second stream
9 containing drilling fluid, and

10 feeding the first stream to shale shaker apparatus
11 producing a primary stream and a secondary stream, the primary
12 stream including beads and drilling fluid.

1 2. The method of claim 1 wherein the initial stream is about
2 50% beads by volume and about 50% drilling fluid by volume.

1 3. The method of claim 1 wherein the beads are hollow glass
2 beads.

1 4. The method of claim 1 wherein the second stream is
2 drilling fluid substantially free of beads.

1 5. The method of claim 1 wherein the first stream is, by
2 volume, between 10% to 30% beads and 70% to 90% drilling fluid.

1 6. The method of claim 1 wherein the first stream is, by
2 volume, about 20% beads and about 80% drilling fluid.

1 7. The method of claim 1 wherein the shale shaker apparatus
2 includes at least one shale shaker having vibrating apparatus able
3 to produce forces of at least 5.5 G force.

1 8. The method of claim 1 wherein the shale shaker apparatus
2 includes at least one shale shaker having vibrating apparatus able
3 to produce forces of at least 6.2 G force.

1 9. The method of claim 1 wherein the primary stream is, by
2 volume, about 50% beads and about 50% drilling fluid.

1 10. The method of claim 1 wherein the hydrocyclone has an
2 interior lined with soft material to reduce bead breakage.

1 11. The method of claim 1 further comprising

2 feeding the primary stream into a flow of drilling
3 fluid flowing upwardly within a riser to reduce density of
4 said drilling fluid flowing upwardly within the riser.

1 12. A method for providing a mixture of drilling fluid and
2 beads into a flow of drilling fluid flowing upwardly within a
3 riser, the method comprising

4 introducing an initial stream including a mixture of
5 drilling fluid and beads into a hydrocyclone,

6 processing the initial stream with the hydrocyclone
7 producing a first stream and a second stream, the first stream
8 containing drilling fluid and beads and the second stream
9 containing drilling fluid, and

10 feeding the first stream to shale shaker apparatus
11 producing a primary stream and a secondary stream, the primary
12 stream including beads and drilling fluid,

13 wherein the second stream is drilling fluid
14 substantially free of beads,

15 wherein the first stream is, by volume, between 10%
16 to 30% beads and 70% to 90% drilling fluid,

17 wherein the shale shaker apparatus includes at least
18 one shale shaker having vibrating apparatus able to produce
19 forces of at least 5.5 G force,

20 wherein the primary stream is, by volume, about 50%
21 beads and about 50% drilling fluid, and

22 feeding the primary stream into a flow of drilling
23 fluid flowing upwardly within a riser to reduce density of
24 said drilling fluid flowing upwardly within the riser.

1 13. A method for moving drilling fluid into and out of a
2 wellbore, the wellbore having therein drilling apparatus, and an
3 annulus for fluid flow between an exterior of the drilling
4 apparatus and an interior surface of the wellbore, the wellbore
5 extending from an earth surface down into the earth, the method
6 comprising

7 flowing drilling fluid down into the drilling

8 apparatus and out therefrom into the annulus,
9 flowing the drilling fluid upwardly in the annulus
10 back to the earth surface,
11 pumping into the drilling fluid flowing upwardly in
12 the annulus a primary stream containing a mixture of drilling
13 fluid and beads to reduce density of the drilling fluid
14 flowing upwardly in the annulus, and
15 the primary stream produced by feeding a first
16 stream to shale shaker apparatus and thereby producing the
17 primary stream as overflow material off a top of the shale
18 shaker apparatus.

1 14. The method of claim 13 further comprising
2 producing the primary stream by flowing an output
3 stream from hydrocyclone apparatus to the shale shaker
4 apparatus, and
5 the output stream including drilling fluid and
6 beads.

1 15. The method of claim 13 wherein the beads are hollow glass
2 beads .

1 16. The method of claim 13 wherein the initial stream is
2 about 50% beads by volume and about 50% drilling fluid by volume.

1 17. A method for providing a mixture of drilling fluid and
2 beads into a flow of drilling fluid flowing upwardly within a
3 riser, the method comprising

4 continuously introducing an initial stream including
5 a mixture of drilling fluid and beads into a hydrocyclone,
6 processing the initial stream with the hydrocyclone
7 producing a first stream and a second stream, the first stream
8 containing drilling fluid and beads and the second stream
9 containing drilling fluid,

10 continuously producing the first stream and
11 continuously feeding the first stream into the riser
12 to continuously reduce density of drilling fluid therein.

1 18. The method of claim 17 further comprising

continuously feeding the first stream to shale shaker apparatus producing a primary stream of drilling fluid and beads, and

feeding the primary stream into the annulus.

19. A method for providing a mixture of drilling fluid and beads into a flow of drilling fluid flowing upwardly within a riser, the method comprising

introducing an initial stream including a mixture of drilling fluid and beads into a hydrocyclone,

processing the initial stream with the hydrocyclone producing a first stream and a second stream, the first stream containing drilling fluid and beads and the second stream containing drilling fluid, and

feeding the first stream to centrifugal liquid/liquid separator apparatus producing a primary stream and a secondary stream, the primary stream including beads and drilling fluid.

20. The method of claim 19 wherein the beads are hollow glass beads.

21. The method of claim 19 wherein the secondary stream is drilling fluid substantially free of beads.

22. A method for providing a mixture of drilling fluid and beads into a flow of drilling fluid, the method comprising

introducing an initial stream including a mixture of drilling fluid and beads into a hydrocyclone,

processing the initial stream with the hydrocyclone producing a first stream and a second stream, the first stream containing drilling fluid and beads and the second stream containing drilling fluid, and

feeding the first stream to separation apparatus producing a primary stream and a secondary stream, the primary stream including beads and drilling fluid.

1 23. A drilling method comprising
2 drilling with drilling apparatus a wellbore down
3 into earth from an earth surface downwardly,
4 flowing drilling fluid down into the drilling
5 apparatus while drilling,
6 flowing drilling fluid and other material upwardly
7 within the wellbore away from the drilling apparatus,
8 providing a mixture and flowing it into the drilling
9 fluid, the mixture comprising drilling fluid and density-
10 reducing beads, the mixture produced by introducing an initial
11 stream including drilling fluid and beads into a hydrocyclone,
12 processing the initial stream with the hydrocyclone
13 producing a first stream and a second stream, the first stream
14 containing drilling fluid and beads and the second stream
15 containing drilling fluid, and
16 feeding the first stream to separation apparatus
17 producing a primary stream including beads and drilling fluid,
18 and
19 flowing the primary stream into the wellbore.

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2 24. The method of claim 23 wherein the separation apparatus
3 is from the group consisting of shale shaker apparatus and
4 centrifugal liquid/liquid separation apparatus.